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Proceedings of the regional peer review meeting on the Assessment of the Newfoundland West Coast (4R) Herring Stocks

June 11, 2014
Maurice Lamontagne Institute

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Foreword

The purpose of these Proceedings is to document the activities and key discussions of the meeting. The Proceedings may include research recommendations, uncertainties, and the rationale for decisions made during the meeting. Proceedings may also document when data, analyses or interpretations were reviewed and rejected on scientific grounds, including the reason(s) for rejection. As such, interpretations and opinions presented in this report individually may be factually incorrect or misleading, but are included to record as faithfully as possible what was considered at the meeting. No statements are to be taken as reflecting the conclusions of the meeting unless they are clearly identified as such. Moreover, further review may result in a change of conclusions where additional information was identified as relevant to the topics being considered, but not available in the timeframe of the meeting. In the rare case when there are formal dissenting views, these are also archived as Annexes to the Proceedings.

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SUMMARY

This document contains the proceeding from the meeting held within the regional assessment of the Newfoudland West Coast (4R) herring stocks. This review process was held on June 11th, 2014 at the Maurice Lamontagne Institute in Mont-Joli. This meeting gathered about twenty participants from science to management. This proceeding contains the essential parts of the presentations and discussions held and relates the recommendations and conclusions that were presented during the review.

SOMMAIRE

Ce document renferme le compte rendu de la réunion tenue dans le cadre du processus régional d'évaluation du hareng de la côte ouest de Terre-Neuve (4R). Cette revue, qui s'est déroulée le 11 juin 2014 à l'Institut Maurice-Lamontagne à Mont-Joli, a réuni une vingtaine de participants des sciences et de la gestion des pêches. Ce compte rendu contient l'essentiel des présentations et des discussions qui ont eu lieu pendant la réunion et fait état des recommandations et conclusions émises au moment de la revue.

INTRODUCTION

The Quebec Region of the Department of Fisheries and Oceans (DFO) is responsible for assessing the stocks of several exploited fish and invertebrate species in the Estuary and Gulf of St. Lawrence. Most of these stocks are assessed periodically within a regional advisory process, which is conducted at the Maurice Lamontagne Institute in Mont-Joli. This document consists of the proceedings of the meeting held on March 11, 2014, on the assessment of the west coast of Newfoundland herring stocks.

The objective of the review was to determine whether there were any changes in the resource's status and whether adjustments were required to the management plans based on the chosen conservation approach, the ultimate goal being to provide scientific advice on managing the herring stock for the west coast of Newfoundland (4R) for the 2014 and 2015 fishing seasons.

These proceedings report on the main points discussed in the presentations and deliberations stemming from the activities of the regional stock assessment committee. The regional review is a process open to all participants who are able to provide a critical outlook on the status of the assessed resources. In this regard, participants from outside DFO are invited to take part in the committee's activities within the defined terms of reference for this review (Appendices 1 and 2). The proceedings also focus on recommendations made by the meeting participants.

CONTEXT

Meeting chairperson Yvan Lambert welcomes the participants. He goes over the peer review's objectives and agenda. After the participants introduce themselves, stock assessment biologist François Grégoire begins the review by highlighting the contribution of his collaborators. He presents the meeting agenda and briefly reviews the highlights of the last Science Advisory Report (2012).

ASSESSMENT OF THE RESOURCE

COMMERCIAL FISHERY

The biologist presents the landing statistics by unit area and gear, and catch distribution maps for the three fishing fleets. Based on preliminary data for 2013, herring catches from the west coast of Newfoundland (NAFO Division 4R) totalled 19,364 t for a TAC of 20,000 t. The quotas allocated to the large seiner and fixed gear fleets were nearly reached whereas the quota for small seiners was slightly surpassed.

- There are questions about the small seiner quota being slightly exceeded, which would be associated with longer reaction times to close the fishery due to having to contact a large number of fishers (in the case of the large seiners, most of them are part of the same company).
- It is also pointed out that spring catches are well sampled, even though certain areas are closed to protect the spawn of spring-spawning herring.

MULTIDISCIPLINARY GROUNDFISH SURVEY

The biologist briefly presents information on herring catches from the multidisciplinary groundfish surveys.

- He clarifies that this index is a secondary indicator because this survey mainly targets groundfish.

- A few clarifications are made on the dispersion index in 4R, which represents the herring catch probability.

SENTINEL FISHERY CATCHES

At the industry's request, herring catch distribution maps for mobile sentinel fisheries in July are presented. The catches are mainly on the west coast of Newfoundland, contrary to those in multidisciplinary surveys which are spread throughout the northern Gulf of St. Lawrence.

BIOLOGICAL INDICATORS

Catches-at-age and the key biological indicators are presented for both stocks: spring and fall spawners. Herring catches on the west coast of Newfoundland currently consist of older fish. In 2013, the catch was dominated by fish aged 8+ years. For fall spawners, age 5 herring seem relatively more abundant than in recent years. A significant decrease in the condition index was observed in both stocks over the past three years. These two stocks are also characterized by a clear downward trend in mean weight at age since the early 1980s.

- It is pointed out that the dominant age class is actually the 2001 cohort, not the 2000 cohort. Age determination of older herring can be difficult, which is a research constraint.
- It is agreed that this is a balanced age structure that appears to point to a moderate exploitation rate.
- Based on the current exploitation rate, someone mentions that a herring could live up to 15-20 years. However, for age distribution, these fish are grouped in the 11+ age class since the reading error rate increases for older fish.
- Some participants suggest examining the drop in the condition index in relation to the also decreasing weight at age of current herring stock.

ACOUSTIC SURVEY

An initial series of biannual acoustic surveys was conducted between 1991 and 2002. A new series of acoustic surveys was started in 2009 using a different sampling pattern (unlike the first series, all surveys in the second series began in the northern portion of the west coast of Newfoundland, thereby covering a broader sampling area in this series compared to the first). Based on the acoustic survey, the total biomass index for spring-spawning herring varied between 7,448 t and 14,624 t between 2009 and 2011, then plummeted to only 335 t in 2013. In 2002, spring-spawning herring represented 29.6% of the total herring abundance compared to 0.4% in 2013. The total biomass index for fall-spawning herring has remained between 85,014 t and 121,888 t since 2009.

- A participant suggests not referring to spring-spawning herring trends, given the small sample size.
- The biologist says that it would be very useful to develop an analysis module for a more user-friendly tool to make more rapid calculations and further examine the data.

SEQUENTIAL POPULATION ANALYSIS

A sequential population analysis (SPA) was conducted despite a brief series of acoustic surveys (2009, 2010, 2011 and 2013).

- The biologist clarifies that the results of the analytical model are presented for exploratory purposes only. The model's limits mainly have to do with an insufficient number of surveys, and adjustment problems were noted for the analytical models as a result, particularly among the young age classes.

- Participants wonder whether the first series of surveys could also be used for the SPA. The biologist reminds participants that during the last assessment, a decision was made to only use the most recent series of surveys. The biologist also refers to a research document providing justification for this decision.
- It is mentioned that the industry believes that the acoustic survey was carried out too early. Based on their view, it should be done in December, when herring stocks are at their peak. However, a review of fisheries statistics reveals that the top landings occur in October/November, when the survey was carried out.

ECOSYSTEM CONSIDERATIONS

As part of this review, ecosystem considerations were incorporated through an environmental model presented by Stéphane Plourde. The purpose of this model was to describe the effect of environmental variations (physical and biological) on various herring stock dynamic indicators in 4R, including the spawning stock biomass (SSB). This study also allowed us to make recruitment and spring- and fall-spawning biomass projections for the 2004 to 2012 period for which no satisfactory SPA exists.

- Someone suggests using lengths at age instead of weight at age which, according to some participants, would be redundant with the condition index. It would be interesting to examine the lengths at age to obtain growth information.
- Someone asks about the decrease in recruitment predicted in the model, particularly for the fall stock, whose 2008 age class is large as shown by the data in this assessment. S. Plourde points out that the model provides an accurate prediction of increased recruitment in 2008 compared to 2007, and compared to 2009 and 2010. Several participants also agree that the size of the 2008 age class seems to have been overstated in the first part of the meeting. There is a high level of uncertainty in the model's results.
- For 2004 to 2012, there are concerns about the potential impact of using SPAs when adjusting the model.
- According to the model, the spawning biomass is affected by recruitment and seal abundance. However, some feel that the seal predation effect must be taken with a grain of salt since data describing seal diet are still very sporadic. S. Plourde says that an increase of nearly an order of magnitude in seal abundance should not be ignored and represents a significant change in the predation pressure on herring.
- The model indicates that recruitment is caused by environmental variables. However, participants wonder whether seals also affect recruitment. Some participants feel that predation would mainly target the young age classes, meaning that seal predation would have more of an impact on recruitment than on spawning biomass.

Therefore, the main conclusions arising from these efforts are as follows:

- The variations in the condition index, weight at age (1990-2012) and recruitment (1990-2002) of spring and fall stocks are primarily associated with fluctuations in zooplankton dynamics and physical conditions. The analysis does not reveal that spawning biomass has a significant impact on recruitment.
- Recruitment predictions carried out for the 2003 to 2012 period suggest that recruitment of both stocks dropped in the mid-2000s. This decline was more evident in spring spawners.
- The spring-spawning stock biomass varies depending on fishing mortality, recruitment (environmental effect) and the predation mortality index, whereas the fall stock fluctuates according to recruitment and the predation mortality index. Both stocks have declined in the last ten years.

HIGHLIGHTS AND RECOMMENDATIONS

The highlights are presented and the participants comment on them. Comments having to do with stylistic rewording are not recorded.

- In the first point on herring catches, someone suggests clarifying that the numbers come from 2013 preliminary data.
- The point highlighting catch-at-age should refer to the abundance of the 2008 age class (age 5 herring) in fall herring stocks. It is also mentioned that in 2013, the catch was dominated by fish aged 8+ years.
- A suggestion is made to combine the highlights from the environmental model with the assessment highlights.
- Someone suggests adding a point to describe the variations in weight at age and the condition index.
- In the acoustic survey highlights, it would be preferable not to compare the values obtained between 2009 and 2013 with the 2002 survey values. Uncertainty should also not be mentioned.

Comments on the environmental model highlights:

- As regards variables in environmental condition fluctuations, someone suggests using the conditional tense to add nuance to the wording. It is suggested to adhere closer to the data by stating that the analysis does not reveal a significant impact of spawning biomass on recruitment.
- Regarding recruitment predictions, the participants suggest not referring to order of magnitude with regard to the recruitment decline in the mid-2000s.
- Regarding the point on variations in spawning biomass, someone suggests referring to a predation mortality index rather than seal abundance.

The **recommendations** are reviewed by the participants and presented as follows:

The vast majority of herring catches now consist of fall spawners. In recent years, catches of about 20,000 t have been supported by older fish. Given the age structure of the population, the current catch level should not be increased for 2014 and 2015. Moreover, with the decline in older fish and no significant recruitment, it is unlikely that the current catch level can be sustained in the medium term.

Given the ever-decreasing spring-spawning stock, it is recommended that the management measures implemented in the late 1990s to protect the spawn of this stock remain in place.

RESEARCH PRIORITIZATION

The work deemed a priority by the participants should address the following:

- Development of a more user-friendly acoustic survey analytical module to make calculations faster and further examine data.
- Permutation of spring spawners into fall spawners.

Other research needs are also identified to:

- Improve catches-at-age for the acoustic survey; however, this point was raised after it was pointed out that only 5 spring herrings catches were collected in the acoustic survey. However, the total number of herring caught during the acoustic survey and in areas with strong acoustic signals climbed to 691 compared to 1,559 for all commercial fisheries. These herring were collected with industry assistance and this number is considered

adequate. The low number of spring herring collected is not a result of inadequate sampling, but of stock that has reached its lowest abundance levels.

- Re-examine the possibility of using the two acoustic survey series for the SPA. Review the reasons for incompatibility.

APPENDIX

1. LIST OF PARTICIPANTS

Nom	Affiliation
Beaulieu, Jean-Louis	DFO Science
Bernier, Denis	DFO Science
Bourdages, Hugo	DFO Science
Brassard, Claude	DFO Science
Castonguay, Martin	DFO Science
Cyr, Charley	DFO Science
Desgagnés, Mathieu	DFO Science
Gauthier, Johanne	DFO Science
Gilbert, Michel	DFO Science
Gosselin, Serge	DFO Science
Grégoire, François	DFO Science
Hawkins, Laurie	DFO – Fisheries Management
Hurtubise, Sylvain	DFO Science
Lambert, Yvan	DFO Science
Lehoux, Caroline	DFO Science
McQuinn, Ian	DFO Science
Miller, Roberta	DFO Science
Morneau, Renée	DFO Science
Ouellet, Patrick	DFO Science
Plourde, Stéphane	DFO Science
Sainte-Marie, Bernard	DFO Science
Simm, Jason	DFO – Fisheries Management

2. TERMS OF REFERENCE

Assessment of the 4R herring stocks in 2013

Regional Peer Review - Quebec Region

June 11, 2014
Mont-Joli, QC

Chairperson: Yvan Lambert

Context

The west coast of Newfoundland herring fishery is managed by a Total Allowable Catch (TAC) associated with both spawning stocks. The current TAC of 20,000 t was set during the last analytical assessments. The TAC split between the various fleets is as follows: 55% for large seiners (> 65 '), 22% for small seiners (<65') and 23% for fixed gear.

A first series of acoustic surveys was conducted between 1991 and 2002 with the objective to evaluate the abundance of the two spawning stocks. A second series of surveys was initiated in the fall of 2009 following the recommendations from the Fisheries Resource Conservation Council (FRCC) and with the support of the Larocque scientific program funds for the chartering of a fishing vessel, and the collect and analysis of the data. When this series will be long enough, it will allow the use of an analytical assessment and the update of biological reference points that were established from the results of the first series of surveys. They will help develop a strategic framework for fisheries consistent with the precautionary approach. This framework aims to reduce the risk of serious or irreversible damage to commercially exploited stocks.

The last assessment of the two herring spawning stocks in 4R dates back to 2012. The Fisheries and Aquaculture Management Branch has requested a scientific advice on these stocks for the 2014 and 2015 fishing seasons. The objective of the review is to determine whether changes that have occurred in the stock status necessitate adjustments to management plans based on the conservation approach used.

Objectives

Provide a scientific advice of the spring and fall spawning herring stocks in NAFO Division 4R (Newfoundland's West coast) for the 2014 and 2015 fishing seasons. This advice shall include:

- An evaluation of the status of the herring stocks in 4R, based on:
  - commercial fishery statistics following the 2012 and 2013 seasons (overall distribution of landings, breakdown by unit area, month and fishing gear, etc...);
  - an update of the main biological indicators (age structure, maturity, condition, etc...);
  - sentinel catches and index of dispersion (not abundance) calculated from the Teleost catches;
  - results of the 2013 fall acoustic survey.
- Presentation of the results of an analytical assessment if the data allow it.
- Ecosystem and environmental considerations.
- The identification and prioritization of research projects to be considered for the future.
- Identification of indicators to follow the stocks status during the years without a formal stock assessment.
- Perspectives and/or recommendations for 2014 and 2015 based on available data.

Expected Publications

- Science Advisory Report (1)
- Proceedings (1)
- Research Documents (3)

Participation

- Fisheries and Oceans Canada (DFO) Science and Fisheries Management
- Newfoundland and Labrador Provincial representatives
- Fishing industry